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Pisces, Gobiiformes, Gobiidae, *Ctenogobius boleosoma* (Jordan & Gilbert, 1882): first record for Maranhão state, northeastern Brazil

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Abstract. This study presents *Ctenogobius boleosoma* from the São Luis estuarine region, the first record from the state of Maranhão, northeastern Brazil. This species may have gone unrecorded from Maranhão due to the difficulties in collecting gobies by the usual sampling methods, such as gill nets, corking nets, and longlines, even when using nets with an appropriate mesh size.

Key words. Canal Raposa; São Luis; estuary; ichthyology; Gobionellinae; Darter Goby

Gobiidae is one of the richest vertebrate families, comprising about 1840 valid species in 5 subfamilies (Eschmeyer et al. 2017). Gobiids are widely distributed throughout the tropical and subtropical regions and occur in marine, estuarine and freshwater environments (Nelson et al. 2016, Froese & Pauly 2017). The family has extensive recent literature on its taxonomy, phylogeny, and composition, although its taxonomy is not yet stabilized (see Nelson et al. 2016).

The genus *Ctenogobius* Gill, 1858 currently comprises 23 valid species, but only 6 of them are recorded for Brazil: *Ctenogobius boleosoma* (Jordan & Gilbert, 1882), *C. saepepallens* (Gilbert & Randall, 1968), *C. shufeldti* (Jordan & Eigenmann, 1887), *C. smaragdus* (Valenciennes, 1837), *C. stigmaticus* (Poey, 1860) and *Ctenogobius thoropsis* (Pezold & Gilbert, 1987) (Froese & Pauly 2017). According to Pezold (2004), the lack of lobes or gill rakers on the anterior surface of the first epibranchial is the main synapomorphy of *Ctenogobius*. In addition, the genus can be diagnosed by the presence of a short lateral cephalic canal with only 2 pores; 4 or 5 gill rakers on posterior surface of first gill arch and gill rakers short and triangle shaped; an abbreviated oculoscapular canal that terminates above the preoperculum with an A'BCDFH' pattern; a simple or triangulate fourth neural spine; and a diagonal posterior opercular neuromast row (Smith 1997, Murdy & Hoese 2002, Ross & Rhode 2004, Pezold 2004).

Ctenogobius boleosoma is distributed from North Carolina (USA), the Bahamas, and the northern Gulf of Mexico to the estuarine region of Rio Grande do Sul (Brazil). This species is known to occur in the following Brazilian states: Bahia, Ceará, Espirito Santo, Pará, Paraíba, Paraná, Pernambuco, Rio de Janeiro, Rio Grande do Norte, Rio Grande do Sul, São Paulo, and Santa Catarina (Rosa et al. 1997; Araújo et al. 2000; Bizerril & Costa 2001; Joyeux et al. 2004; Clauzet et al. 2005; Sarpedonti et al. 2008; Reis-Filho et al. 2010; Paiva and Araujo 2010; Spach et al. 2010; Menezes 2011; Passos et al. 2012; Machado 2013; Costa et al. 2013; Lima-Filho et al. 2014; Oliveira & Pessanha 2014; Sarmento-Soares & Martins-Pinheiro 2014; Borgo et al. 2015; Molitzas 2015; Lamas et al. 2016; Petry et al. 2016; Froese & Pauly 2017; Eschmeyer et al. 2017). The present study presents the first record of *C. boleosoma* from the state of Maranhão, northeastern Brazil.

One specimen of *C. boleosoma* (Fig. 1) was collected at the estuary of the Canal Raposa, Raposa Municipality, north end of Ilha de São Luis, Maranhão (02°25′22″ S, 044°05′21″ W; leg. P. Brito and A. Ramos, 6 June 2013) (Figs. 2, 3). The water temperature was 27.9 °C; dissolved oxygen, 10.4 mg/L; water salinity, 37%; and water depth, approximately 50 cm.

The collection was conducted during the daytime period,

Figure 1. *Ctenogobius boleosoma*: CICCAA 00202, 38.3 mm SL; estuary of Canal Raposa, Ilha de São Luis, Maranhão, northeastern Brazil.

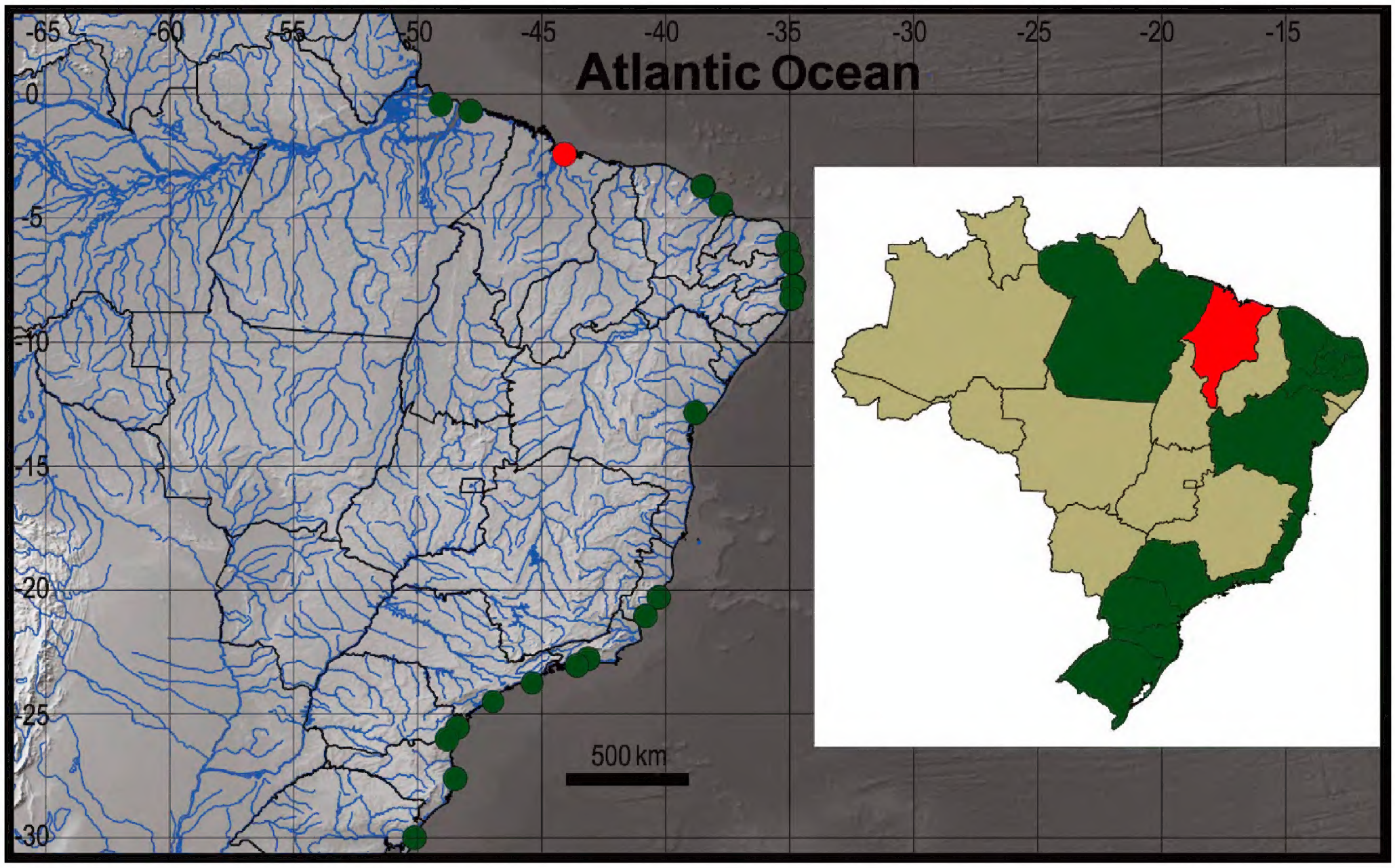

Figure 2. Records of *Ctenogobius boleosoma* in Brazil: red state – Maranhão state, the new documented state where the species occurs; green states – Brazilian states where the species was previously recorded according to the literature cited below; red circle – new record for the Canal Raposa, Maranhão state; and green circles – records based on the literature (Rosa et al. 1997, Araújo et al. 2000, Bizerril & Costa 2001, Joyeux et al. 2004, Clauzet et al. 2005, Sarpedonti et al. 2008, Reis-Filho et al. 2010, Paiva & Araujo 2010, Spach et al. 2010, Passos et al. 2012, Machado 2013, Costa et al. 2013, Lima-Filho et al. 2014, Oliveira & Pessanha 2014, Sarmento-Soares & Martins-Pinheiro 2014, Borgo et al. 2015, Molitzas 2015, Lamas et al. 2016, Petry et al. 2016, Froese & Pauly 2017, Eschmeyer et al. 2017).

using a manual trail-net (20 m long × 5 m high; mesh size, 5 mm). This net was trailed by 2 collectors, each one at one extremity of the net, through salt marshes of *Spartina alterniflora* Lousiel (Fig. 3). The collected specimen was fixed in 10% formalin immediately after capture and after 15 days transferred to 70% alcohol for preservation. This material is deposited in the Coleção Ictiológica do Centro de Ciências Agrárias e Ambientais da Universidade Federal do Maranhão (CICCAA 00202). Sampling was conducted under permit ("Autorização para atividade com finalidades científicas", No. 30346-1). Counts and measurements were made according to Murdy & Hoese (2002), and the classification follows Nelson et al. (2016).

The species was identified as *C. boleosoma* (Fig. 1) based on the presence of the following diagnostic characters according to the literature (Murdy & Hoese 2002; Pezold 2004; Froese & Pauly 2017): predorsal area naked; no circular spots on sides of head; 5 round or elongate dark blotches along

Figure 3. Collecting site of *Ctenogobius boleosoma*; estuary of Canal Raposa, Ilha de São Luis, Maranhão state, northeastern Brazil.

midside; 31 scales on lateral row; canine teeth smaller than those of its congeners; and diagonal marks extending upward to form V-shapes. Some meristic and morphometric data of the examined specimen of *C. boleosoma* are presented in Table 1.

The new record is the first documented occurrence of *C. boleosoma* in the estuary of Ilha de São Luis (Figs. 2, 3), as well as the first known occurrence from Maranhão, and helps fill in the gaps in the geographical distribution of this goby species. This new record is significant due to the relative scarcity of knowledge of the ichthyofauna of Maranhão to other states in southern and southeastern Brazil. Most of the ichthyofaunal inventories in Maranhão, including those in marine and estuarine habitats, have used gill nets, corking nets, and longlines, which usually focus on larger species that are important for fisheries but not efficient ways to collect small specimens (e.g., Martins-Juras et al. 1987; Rocha and Rosa 2001; Araujo-Junior et al. 2005; Neta & Castro 2008; Nunes et al. 2011).

Table 1. Meristic data of *Ctenogobius boleosoma* from the estuary of Canal Raposa, Ilha de São Luis, Maranhão state, northeastern Brazil (CICCAA 00202).

Character	
Standard length (SL)	**38.3 mm**
Percents of standard length	
Head length (HL)	24.7
Body	12.3
Head depth	13.5
Predorsal distance	34.5
Prepectoral distance	21.7
Prepelvic distance	19.6
Preanal distance	48.8
Percents of head length	
Horizontal eye diameter	17.2
Counts	
Second dorsal-fin total elements	11
Pectoral-fin total elements	16
Anal-fin total elements	13
scales on lateral row	31

Thus, *C. boleosoma* could have gone unrecorded from Maranhão because of this species' small size (maximum total length, 7.5 cm; Froese & Pauly 2017). However, even with nets with an appropriate mesh size, it is often difficult to collect *C. boleosoma* over muddy bottoms because this species burrows into the bottom to avoid capture. Rotenone remains the best method to assess the diversity and quantify abundance of gobies, and the hesitation to allow use it is major reason why we have gaps in our knowledge of goby distributions.

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LITERATURE CITED

Araújo-Júnior, E.S., Pinheiro-Júnior, J.R. & Castro, A.C.L. 2005. Ictiofauna acompanhante da pesca do camarão branco, *Penaeus* (*Litopenaeus*) *schmitti* Burkenroad. (1936) no estuário do Rio Salgado, Alcântara-Ma. Boletim do Laboratório de Hidrobiologia 18: 33–41.

Araújo, M.E., Teixeira, J.M. & Oliveira, A.M.E. 2000. Ictiofauna marinha do estado do Ceará, Brasil: III. Actinopterygii de estuários. Arquivo de Ciências do Mar 33: 139–142.

Bizerril, C.R.S.F. & Costa, P.A.S. 2001. Peixes marinhos do estado do Rio de Janeiro. 1ª edição. Rio de Janeiro: FEMAR. 234 pp.

Borgo, D., Catani, A.P., Ribeiro, G.C., Pichler, H.A., Hostim-Silva, M., Clezar, L., Santos, L.O. & Spach, H.L. 2015. Os padrões de distribuição dos peixes de uma laguna costeira aberta no Atlântico oeste subtropical são inluenciados pelas variações espaciais e sazonais? Biotemas 28: 93–105. https://doi.org/10.5007/2175-7925.2015v28n3p93

Camargo, M. & Isaac, V.J. 2003. Ictiofauna estuarina, pp. 105–142, in: Fernandes, M.E.B. (ed.). Os manguezais da costa Norte brasileira. Vol. 1. São Luís: Fundação Rio Bacanga. 257 pp.

Clauzet, M., Ramires, M. & Barrella, W. 2005. Pesca artesanal e conhecimento local de duas populações caiçaras (Enseada do Mar Virado e Barra do Una) no litoral de São Paulo, Brasil. MultiCiência 4: 1–22.

Costa, M.R., Pereira, H.H., Neves, L.M. & Araujo, F.G.. 2013. Length–weight relationships of 23 fish species from southeastern Brazil. Journal of Applied Ichthyology 1: 230–232. https://doi.org/10.1111/jai.12275

Eschemeyer, W.N. & Fong, J.D. 2017. Catalog of fishes, version 2017.1. San Francisco: California Academy of Sciences. Accessed at http://researcharchive.calacademy.org, 3 January 2017.

Eschmeyer, W.N., Fricke, R. & Van der Laan, R. 2017. Catalog of fishes, version 2017.1. California Academy of Sciences. Accessed at http://researcharchive.calacademy.org, 3 January 2017.

Froese, R. & Pauly, D. 2017. FishBase. 2017.1 World Wide Web electronic publication. Accessed at http://www.fishbase.org, 3 January 2017.

Joyeux, J.C., Pereira, B.B. & Almeida, H.G.. 2004. The flood-tide ichthyoplanktonic community at the entrance into a Brazilian tropical estuary. Journal of Plankton Research 26:1277–1287. https://

doi.org/10.1093/plankt/fbh119

Lamas, R.A., Rossi-Wongtschowski, C.L.D.B. & Contente, R.F. 2016. Checklist of the fish fauna of the Araçá Bay, São Sebastião Channel, northern coast of São Paulo, Brazil. Check List 12: 2004. https://doi.org/10.15560/12.6.2004

Lima-Filho, P.A., Bertollo, L.A.C., Cioffi, M.B., Costa, G.W.W.F. & Molina, W.F. 2014. Karyotype divergence and spreading of 5S rDNA sequences between genomes of two species: Darter and emerald gobies (*Ctenogobius*, Gobiidae). Cytogenetic and Genome Research 142: 197–203. https://doi.org/10.1159/000360492

Machado, F.S. 2013. Ictiofauna de poças de maré do Brasil: padrões latitudinais [MSc dissertation]. Belém: Universidade Federal do Pará. 87 pp.

Martins-Juras, I.A.G.M., Juras, A.A., & Menezes, N.A. 1987. Relação preliminar dos peixes da ilha de São Luís, Maranhão, Brasil. Revista Brasileira de Zoologia 4: 105–113. http://doi.org/cx4znd

Menezes, N.A. 2011. Checklist dos peixes marinhos do Estado de São Paulo, Brasil. Biota Neotropica 11(Suppl. 1): 33–46. https://doi.org/10.1590/S1676-06032011000500003

Molitzas, R.G. 2015. Mudança temporal dos sistemas pesqueiros da Vila Barra do Una (Peruíbe/SP) [MSc dissertation]. Santos: Universidade Santa Cecília. 48 pp.

Murdy, E.O & Hoes, D.F. 2002. Gobiidae; pp. 601–1374, in: Carpenter, K.E. 2002. The living marine resources of the western Central Atlantic. Vol. 2. Bony fishes, part 1 (Acipenseridae to Grammatidae). FAO Species Identification Guide for Fishery Purposes and American Society of Ichthyologists and Herpetologists Special Publication. Rome: FAO.

Nelson, J.S., Grande, T.C. & Wilson, M.V.H. 2016. Fishes of the world. Hoboken: John Wiley & Sons. 651 pp.

Neta, R.N.F. & Castro, A.C.L.. 2008. Diversity of the estuarine fish assemblages on Crabs Island, Maranhão state. Arquivos de Ciência do Mar 41: 48 – 57.

Nunes, J.L.S., Silva, N.K.A. & Piorski, N.M. 2011. Lista de peixes marinhos e estuarinos do Maranhão. 1º edição. São Luís: Café & Lápis. 196 pp.

Oliveira, R.E.M.C.C. & Pessanha, A.L.M. 2014. Fish assemblages along a morphodynamic continuum on three tropical beaches. Neotropical Ichthyology 12: 165–175. http://doi.org/f54brs

Paiva, A.C.G. & Araújo, M.E. 2010. Environmental characterization and spatial distribution of fish fauna in estuaries in the state of Pernambuco, Brazil. Tropical Oceanography 38: 1–46.

Passos, A.C., Contente, R.F., Araújo, C.C.V., Daros, F.A.L.M., Spach, H.L., Abilhôa, V. & Fávaro, L.F. 2012. Fishes of Paranaguá estuarine complex, South West Atlantic. Biota Neotropica 12: 226–238. http://doi.org/b635

Petry, A.C., Guimarães, T.F.R., Vasconcellos, F.M., Hartz, S.M., Becker, F.G., Rosa, R.S., Goyenola, G., Caramaschi, E.P., Díaz de Astarloa, J.M., Sarmento-Soares, L.M., Vieira, J. P., Garcia, A.M., Teixeira de Mello, F., Melo, F.A.G de., Meerhoff, M., Attayde, J.L., Menezes, R.F., Mazzeo, N. & Di Dario, F.. 2016. Fish composition and species richness in eastern South American coastal lagoons: additional support for the freshwater ecoregions of the world. Journal of Fish Biology 89: 280–314. https://doi.org/10.1111/jfb.13011

Pezold, F. 2004. Phylogenetic analysis of the genus *Gobionellus* (Teleostei: Gobiidae. Copeia 2004: 260–280. http://doi.org/cx8w7g

Reis-Filho, J.A., Nunes, J.A.C.C. & Ferreira, A.. 2010. Estuarine ichthyofauna of the Paraguaçu River, Todos os Santos Bay, Bahia, Brazil. Biota Neotropica 10: 301–312.

Robertson, D.R. & Van Tassell, J. 2015. Shorefishes of the Greater Caribbean online information system. Version 1.0. Balboa, Panama: Smithsonian Tropical Research Institute. Accessed at http://biogeodb.stri.si.edu/caribbean/en/pages, 25 June 2016.

Rocha, L.A. & Rosa, I.S. 2001. Baseline assessment of reef fish assemblages of Parcel Manuel Luiz Marine State Park, Maranhão, north-east Brazil. Journal of Fish Biology 58: 985–998. https://doi.org/10.1006/jfbi.2000.1504

Rosa, R.S., Rosa, I.L. & Rocha, L.A. 1997. Diversidade da Ictiofauna de poças de até da praia do Cabo Branco, João Pessoa, Paraíba, Brasil. Revista Brasileira de Zoologia 14: 201–212.

Ross, S.W. & Rhode, F.C. 2004. The gobioid fishes of North Carolina (pisces: gobioidei). Bulletin of Marine Science 74: 287–323.

Sarpedonti, V., Anunciação, E.M.S. & Nahum, V.J.I. 2008. Ichthyoplankton variations in two mangrove creeks of the Curuçá estuary, Pará, Brazil. Ecotrópicos 21: 1–12.

Sarmento-Soares, L.M., Mazzoni, R. & Martins-Pinheiro, R.F. 2007. A fauna de peixes na bacia do Rio Peruípe, extremo Sul da Bahia. Biota Neotropica 7: 291–308.

Sarmento-soares, L.M. & Martins-Pinheiro, R.F. 2014. A fauna de peixes nas bacias do O sul do Espírito Santo, Brasil. Sitientibus Série Ciências Biológicas 13: 1–37. https://doi.org/10.13102/scb218

Spach, H.L., Silva, A.L.C., Bertolli, L.M., Cattani, A.P., Budel, B.R. & Santos, L.O. 2010. Assembleias de peixes em diferentes ambientes da desembocadura do Rio Saí Guaçu, Sul do Brasil. Pan-American Journal of Aquatic Sciences 5: 126–138.

Smith, C.L. 1997. National Audubon Society field guide to tropical marine fishes of the Caribbean, the Gulf of Mexico, Florida, the Bahamas, and Bermuda. New York: Alfred A. Knopf. 720 pp.

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